

## CLAIMS

What is claimed is:

1 1. A method comprising:  
2       executing a first thread of instructions to process a first graphical element of an  
3 image to be displayed;  
4       executing a second thread of instructions to process a second graphical element of  
5 the image to be displayed;  
6       placing the first thread of instructions in an inactive state in response to detection  
7 of at least one of a set of predetermined conditions related to a relationship between the  
8 first graphical element and the second graphical element;  
9       maintaining the first thread of instructions in the inactive state until a message is  
10 received from a semaphore entity; and  
11       resuming execution of the first thread of instructions in response to receiving the  
12 message from the semaphore entity.

1       2. The method of claim 1 wherein the set of predetermined conditions  
2 comprises an unresolved dependency.

1       3. The method of claim 1 wherein the set of predetermined conditions  
2 comprises the lack of a response from the semaphore indicating that a resource  
3 corresponding to the semaphore is unavailable.

1       4. The method of claim 1 further comprising maintaining an indication of a  
2 state for the first thread of instructions and for the second thread of instructions.

1           5.       The method of claim 4 wherein the indication of the state of each thread  
2       comprises a state variable corresponding to a dependency, if any, of an associated thread.

1           6.       The method of claim 1 wherein the first thread comprises a first set of ray  
2       tracing instructions and the first graphical element comprises a first ray segment, and  
3       further wherein the second thread comprises a second set of ray tracing instructions and  
4       the second graphical element comprises a second ray segment.

1           7.       The method of claim 1 wherein the first thread comprises a first set of  
2       video decoding instructions and the first graphical element comprises a first picture  
3       segment, and further wherein the second thread comprises a second set of video decoding  
4       instructions and the second graphical element comprises a second picture segment.

1           8.       The method of claim 7 wherein the first picture segment comprises a first  
2       macroblock and the second picture segment comprises a second macroblock.

1           9.       The method of claim 1 wherein the first thread comprises a first set of  
2       three-dimensional rendering instructions and the first graphical element comprises a first  
3       render primitive, and further wherein the second thread comprises a second set of three-  
4       dimensional rendering instructions and the second graphical element comprises a second  
5       render primitive.

1           10.      The method of claim 9 wherein the first render primitive comprises one of  
2       a first point, a first line, a first triangle, and a first triangle strip, and further wherein the  
3       second render primitive comprises one of a second point, a second line, a second triangle,  
4       and a second triangle strip.

1           11.    The method of claim 9 further comprising:  
2           determining a distance value for the first render primitive;  
3           determining a distance value for the second render primitive;  
4           comparing the distance value for the first render primitive and the second render  
5    primitive to determine a relationship between the first render primitive and the second  
6    render primitive; and  
7           displaying a selected one of the first render primitive and the second render  
8    primitive based on the relationship between the first render primitive and the second  
9    render primitive.

1           12.    An apparatus comprising:  
2           execution circuitry to receive and execute a first thread of instructions  
3    corresponding to a first graphical element of an image and a second thread of instructions  
4    corresponding to a second graphical element of the image, wherein the execution circuit  
5    transmits a semaphore request message and places the first thread in an inactive state in  
6    response to the first thread requiring a resource having an associated semaphore; and  
7           a semaphore entity coupled with the execution circuitry to receive the semaphore  
8    request message from the execution circuitry and to selectively grant control of the  
9    semaphore in response to the semaphore request message by transmitting a semaphore  
10   acknowledge message to the execution circuitry, wherein the execution circuitry, in  
11   response to receiving the semaphore acknowledge message, removes the thread of  
12   instructions from the inactive state.

1           13.    The apparatus of claim 12 wherein the execution circuitry comprises:

2           a first execution circuit to execute the first thread of instructions; and  
3           a second execution circuit to execute the second thread of instructions.

1           14.    The apparatus of claim 12 wherein the first thread comprises a first set of  
2   ray tracing instructions and the first graphical element comprises a first ray segment, and  
3   further wherein the second thread comprises a second set of ray tracing instructions and  
4   the second graphical element comprises a second ray segment.

1           15.    The apparatus of claim 12 wherein the first thread comprises a first set of  
2   video decoding instructions and the first graphical element comprises a first picture  
3   segment, and further wherein the second thread comprises a second set of video decoding  
4   instructions and the second graphical element comprises a second picture segment.

1           16.    The apparatus of claim 15 wherein the first picture segment comprises a  
2   first macroblock and the second picture segment comprises a second macroblock.

1           17.    The apparatus of claim 12 wherein the first thread comprises a first set of  
2   three-dimensional rendering instructions and the first graphical element comprises a first  
3   render primitive, and further wherein the second thread comprises a second set of three-  
4   dimensional rendering instructions and the second graphical element comprises a second  
5   render primitive.

1           18.    The apparatus of claim 17 wherein the first render primitive comprises one  
2   of a first point, a first line, a first triangle, and a first triangle strip, and further wherein  
3   the second render primitive comprises one of a second point, a second line, a second  
4   triangle, and a second triangle strip.

1           19. The apparatus of claim 12 further comprising a memory coupled with the  
2 execution circuitry to store the first thread of instructions and the second thread of  
3 instructions.

1           20. The apparatus of claim 12 further comprising:  
2           at least one additional execution circuit to execute threads of instructions; and  
3           a thread dispatcher coupled with the execution circuitry and at least one additional  
4 execution circuit to dispatch threads for execution.

1           21. The apparatus of claim 12 wherein when the first thread of instructions is  
2 in the inactive state, execution of the instructions ceases and the execution circuitry does  
3 not poll the semaphore entity to determine a status of the semaphore request message.

1           22. An apparatus comprising:  
2           means for executing a first thread of instructions to process a first graphical  
3 element in an image to be displayed;  
4           means for executing a second thread of instructions to process a second graphical  
5 element in the image to be displayed;  
6           means for placing the first thread of instructions in an inactive state in response to  
7 detection of at least one of a set of predetermined conditions related to a relationship  
8 between the first graphical element and the second graphical element;  
9           means for maintaining the first thread of instructions in the inactive state until a  
10 message is received from a semaphore entity; and

11           means for resuming execution of the first thread of instructions in response to  
12   receiving the message from the semaphore entity.

1           23.    The apparatus of claim 22 wherein the first thread comprises a first set of  
2   ray tracing instructions and the first graphical element comprises a first ray segment, and  
3   further wherein the second thread comprises a second set of ray tracing instructions and  
4   the second graphical element comprises a second ray segment.

1           24.    The apparatus of claim 22 wherein the first thread comprises a first set of  
2   video decoding instructions and the first graphical element comprises a first macroblock,  
3   and further wherein the second thread comprises a second set of video decoding  
4   instructions and the second graphical element comprises a second macroblock.

1           25.    The apparatus of claim 22 wherein the first thread comprises a first set of  
2   three-dimensional rendering instructions and the first graphical element comprises a first  
3   render primitive, and further wherein the second thread comprises a second set of three-  
4   dimensional rendering instructions and the second graphical element comprises a second  
5   render primitive.

1           26.    A system comprising:  
2           a memory controller;  
3           execution circuitry coupled with the memory controller to receive and execute a  
4   first thread of instructions corresponding to a first graphical element of an image and a  
5   second thread of instructions corresponding to a second graphical element of the image,  
6   wherein the execution circuit transmits a semaphore request message and places the first

7        thread in an inactive state in response to the first thread requiring a resource having an  
8        associated semaphore; and  
9                a semaphore entity coupled with the execution circuitry to receive the semaphore  
10      request message from the execution circuitry and to selectively grant control of the  
11      semaphore in response to the semaphore request message by transmitting a semaphore  
12      acknowledge message to the execution circuitry, wherein the execution circuitry, in  
13      response to receiving the semaphore acknowledge message, removes the thread of  
14      instructions from the inactive state.

1                27.      The system of claim 26 wherein the execution circuitry comprises:  
2                    a first execution circuit to execute the first thread of instructions; and  
3                    a second execution circuit to execute the second thread of instructions.

1                28.      The system of claim 26 wherein the first thread comprises a first set of ray  
2      tracing instructions and the first graphical element comprises a first ray segment, and  
3      further wherein the second thread comprises a second set of ray tracing instructions and  
4      the second graphical element comprises a second ray segment.

1                29.      The system of claim 26 wherein the first thread comprises a first set of  
2      video decoding instructions and the first graphical element comprises a first macroblock,  
3      and further wherein the second thread comprises a second set of video decoding  
4      instructions and the second graphical element comprises a second macroblock.

1                30.      The system of claim 29 wherein the first picture segment comprises a first  
2      macroblock and the second picture segment comprises a second macroblock.

1           31. The system of claim 26 wherein the first thread comprises a first set of  
2 three-dimensional rendering instructions and the first graphical element comprises a first  
3 portion render primitive, and further wherein the second thread comprises a second set of  
4 three-dimensional rendering instructions and the second graphical element comprises a  
5 second render primitive.

1           32. The system of claim 31 wherein the first render primitive comprises one of  
2 a first point, a first line, a first triangle, and a first triangle strip, and further wherein the  
3 second render primitive comprises one of a second point, a second line, a second triangle,  
4 and a second triangle strip.

1           33. The system of claim 26 further comprising a memory coupled with the  
2 memory controller to store the first thread of instructions and the second thread of  
3 instructions.

1           34. The system of claim 26 wherein when the first thread of instructions is in  
2 the inactive state, execution of the instructions ceases and the execution circuitry does not  
3 poll the semaphore entity to determine a status of the semaphore request message.